

BIOCONTROL

PROGRAM PROFILE

Goal	To safeguard plant and animal resources from exotic pests and diseases and to protect plant resources by managing pests.
Enabling Legislation	7 USC 147; PL 78-425; Organic Act of 1944.
Economic Significance	The Colorado Potato Beetle (CPB) causes millions of dollars in losses per year. The total loss attributed to Russian Wheat Aphid (RWA) exceeds \$1 billion since 1987. Whitefly transmitted diseases have caused staggering losses to desert southwest agriculture in the last 10 years.
Principal Approach And Methods Used to Achieve Goals	Program methods include foreign and local field collections, release and redistribution of biocontrol agents, and evaluation. The whitefly program involves identifying strains, identifying whitefly transmitted viruses of crop plants; obtaining natural enemies; and propagating natural enemies at APHIS laboratories and field insectaries.
History	The production of beneficial organisms occurred during the following periods for biological control of the cereal leaf beetle 1966-1979, CPB 1985-present, Diffuse and Spotted Knapweed 1985-present, RWA 1986-present, leafy spurge in 1987-present, and SLW 1991-present.
State and Local Cooperation	No specific matching requirements, but States provide personnel, field evaluation support, and funding.
Involvement of Other Agencies	APHIS applies Agricultural Research Service (ARS) research on crop pests. Program works with the Economic Research Service; the Cooperative State Research Service; Extension Service; industry; EPA; and other international, Federal, or State agencies to develop technologies to manage these pests.

RESOURCE DATA

-----Obligations-----

	<u>Direct</u>	<u>Reimbursement</u>	<u>User Fees</u>	<u>Staff-Years</u>
FY 1996	\$8,609,038	--	--	117
FY 1997	\$8,256,731	--	--	127
FY 1998	\$8,166,595	--	--	132
FY 1999 (est.)	\$8,160,000	--	--	132
FY 2000 (est.)	\$8,160,000	--	--	130

	<u>APHIS</u>	<u>Coop</u>	<u>Total</u>	<u>CCC</u>	<u>Contingency Fund</u>
Cum.	\$99,886,650	\$27,094,913	\$126,981,563		\$74,444

RECENT ACCOMPLISHMENTS

Brown Citrus Aphid (BCA)

In FY 1998, APHIS continued working with the University of Florida to study the BCA's population dynamics, mortality factors, and alternate hosts; evaluate exotic natural enemy species; and evaluate the impact of population suppression on aphid biology and virus movement. In Florida, the program conducted field efficacy studies since the aphid is now infesting citrus production areas in central and northern Florida. APHIS studies indicate that natural enemies hold significant potential for controlling the BCA in a sustainable manner that is economically and socially acceptable in most situations. Also, the Agency is exploring the use of fungi as biocontrol agents. Field trials using entomopathic fungi demonstrated over 90 percent mortality of BCA's after spring applications in Florida citrus groves.

Colorado Potato Beetle (CPB)

In North Dakota, APHIS conducted several large field demonstrations of CPB management in cooperation with the Red River Valley Potato Growers Association,

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North Dakota State University, Mycotech Corporation, and ARS. An economic evaluation conducted in FY 1997-98 indicates that CPB control was feasible using the commercially-produced, fungal pathogen *Beauveria bassiana* as a substitute for or along with conventional insecticides at critical times in the CPB's lifecycle. Working with the University of Delaware, APHIS demonstrated the efficacy of applying eggs of *P. bioculatus* directly to potato foliage and indicated that this predator causes significant larval mortality in an IPM program. As part of an IPM program in Maine, *P. bioculatus*, *Bacillus thuringiensis*, and *B. bassiana* were successfully used for pest suppression. The APHIS CPB project has successfully demonstrated environmentally safe, alternative control measures with the potential for economical, area-wide use and with minimum need for synthetic insecticides. In FY 1998, the project concluded technology transfer of the strategies to the customers.

Boll Weevil

The Mission Center continued developing alternative management strategies to support boll weevil eradication. These strategies are necessary because of the continuing expansion of urban populations into cotton production areas. During FY 1998, the Center maintained two cultures of *Catolaccus grandis*. These cultures provided parasitoids for cage and field evaluations in cotton for efficacy tests. The *C. grandis* project, which encompasses 100 acres, involves a partnership with ARS, Texas A&M, Sanidad Vegetal, and cotton growers.

Leafy Spurge

This project is in the final stages of the delivery phase. It is anticipated that the biocontrol strategy will ultimately control 60-70 percent of the leafy spurge in the U.S., with an economic benefit of \$60 million annually. In FY 1998, APHIS collaborated in the joint Team Leafy Spurge Demonstration project in the four-state area of Montana, North Dakota, South Dakota, and Wyoming. This project provides land managers with several biocontrol-based options for managing this weed. Throughout the distribution program, APHIS has employed six flea beetles, a bud gall midge, a root-boring beetle, and a root-boring moth for leafy

spurge biocontrol. APHIS has released these agents in more than 150 counties in 19 states, and establishment rates have generally exceeded 80 percent. The most widely distributed biocontrol agents continue to be the *Aphthona* flea beetles. When successfully established, these beetles may cause 80-90 percent reductions in leafy spurge density. In FY 1998, local cooperators continued to distribute millions of agents from established populations to initiate new releases in their states. The Bozeman Center continued to provide research-based technical support to cooperators, particularly in agent sampling, collection, and the use of biocontrol agents in integrated weed management strategies. The APHIS distribution program has ensured that biocontrol agents are well established across regions of the U.S. that are infested with leafy spurge.

Russian Wheat Aphid (RWA)

APHIS continued rearing and releasing exotic natural enemies against the RWA as part of a multi-agency, IPM program conducted with other Federal and State agencies. The Agency released over 867,000 parasites in three States (CA, UT, WA) in FY 1998, compared to over 650,000 parasites in five States in FY 1997. As part of the program's technology transfer to interested States, APHIS conducted intensely managed releases at wildlife refuges or along waterways in Utah and Washington. APHIS has completed the planned phase-out for this project.

Saltcedar

Saltcedar is a weed that infests habitats in several western States, primarily in the southwest. In June 1998, APHIS representatives met with representatives from several other Federal agencies in Reno, Nevada to discuss biocontrol of the saltcedar using two insects: *Trabutina mannipara* (a mealybug from Israel) and *Diorhabda elongata* (a leaf beetle from China and central Asia). The group proposed protocols and safeguards for endangered species that were included in an action plan that ARS submitted to the FWS in July 1998. This proposal recommended releases in a limited number of sites far away from where the flycatcher is nesting in saltcedar. FWS approved the proposal on December 28, 1998. As a safeguard against

over-population of the insects, the first year of natural enemy releases will be in cages. The second and third years will be a continuation of ARS research into insect population growth and dispersal. The results of that research will be incorporated into a biological assessment for the implementation of biocontrol over a larger area. A saltcedar biocontrol consortium, comprised of various USDA agencies, universities, and stakeholder groups will oversee issues such as public education; funding; cooperator responsibilities; and the release and monitoring of insects, vegetation, and wildlife. This consortium will also make recommendations on implementing the action plan.

We have already published the environmental assessment -- EA -- for the leaf beetle in the Federal Register and are currently drafting an EA for the mealybug that will be published in the Federal Register this summer. These EAs are designed to determine if releasing these agents will have any significantly adverse environmental impacts. If we so determine, we will prepare a draft "finding of no significant impact" -- FONSI. In addition, we would publish a notice in the Federal Register to make the EA and the FONSI available for public comment. These comments would be included in the final EA. Based on these comments, we would make a final decision -- hopefully by this summer -- on whether or not to issue ARS a permit for the release of the insect agent.

Silverleaf Whitefly

APHIS continued to survey and monitor SLW populations throughout the Lower Rio Grande Valley (LRGV) in FY 1998. The program presented an analysis of SLW population trends from 1991-1998 to growers, thereby providing them with valuable information for managing the pest. Also, the program tested a series of treatments, including a systemic insecticide (imidacloprid), followed by treatments with a biorational entomopathogen (*Beauveria Bassiana*), coupled with releases of an exotic SLW parasitoid. This strategy resulted in a net savings for agricultural producers of several applications of late season pyrethroids in spring melons and cotton. Growers are beginning to implement this strategy because of reduced

input costs and because of realized long-term benefits of releasing parasitoids. BC-IPM efforts have demonstrated that the exotic *Eretmocerus hyatti* parasitoid, originally collected from Pakistan, is established and contributing toward SLW control in the LRGV.

In FY 1998, the program conducted successful grower field trials on cantaloupe melons using a new banker plant strategy to deliver parasitoids to the field. This strategy involves the use of transplants that are inoculated with the Pakistani parasitoid and planted into the field. As the parasitoids mature, they emerge and attack SLW in the field. Then, they migrate to adjacent crops (cotton and soybeans) to further control SLW. This novel delivery method, along with a limited application of a new chemistry insecticide, has proven extremely effective in managing SLW in production systems and will become increasingly important in area-wide management strategies.

In FY 1998, APHIS continued testing, releasing, and augmenting SLW natural enemies in implementation and grower demonstration projects. Evaluations of these efforts indicate that the imported *Eretmocerus* parasitoids from Pakistan and from the United Arab Emirates are established and beginning to regulate SLW populations in the LRGV of Texas, as well as the San Joaquin and Imperial Valleys of California. APHIS continued to support a cooperative national IPM effort through the mass production of beneficial insects for shipments to Arizona, California, Texas, and Puerto Rico. The insects were released in these areas to reduce the economic impact of SLW.

National Biological Control Institute (NBCI)

NBCI participated in Agreement and Grant Programs that supported the information, education, and communication needs of the biocontrol community; the field implementation of biocontrol projects by cooperators; and Post-Doctoral Fellowships to study organisms of critical importance to the biocontrol of agricultural and environmental pests. In FY 1998, NBCI supported 44 projects related to the grant

programs totaling \$515,000. In addition, NBCI and the biocontrol community worked to develop common goals, support interdisciplinary studies, and promote long-term monitoring and evaluation as a standard biocontrol procedure. NBCI also worked with ARS to better educate the public about the benefits of biocontrol as an environmentally and economically acceptable pest management strategy. In addition, NBCI promoted environmental compliance and expedited safe and effective programs by working to improve regulations and procedures for the importation, interstate movement, and releases of biocontrol agents. In addition, NBCI facilitates the development of international programs to safeguard U.S. agriculture and the environment from harmful invasive alien species. In FY 1998, the Pink Hibiscus Mealybug program proved very successful as populations of this pest were reduced by 89% and 95% in St. Thomas and St. Croix, respectively.